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XXXIII. *An Account of the Extraction of three Inches and ten Lines of the Bone of the upper Arm, which was followed by a Regeneration of the bony Matter ; with a Description of a Machine made use of to keep the upper and lower Pieces of the Bone at their proper Distances, during the Time that the Regeneration was taking Place ; and which may also be of Service in Fractures happening near the Head of that Bone. By Mr. Le Cat Professor of Anatomy and Surgery at Rouen, Member of several Academies, and F. R. S. Translated from the French by J. O. Justamond, Surgeon to the First Troop of Horse Grenadier Guards.*

Read Nov. 27, 1766. **I**N the year 1751, I communicated to the academy at Rouen the case of Charles Lehee, a child of three years old, of the village of Pitre, &c. from whom I had extracted an entire tibia, exostosed and carious in its whole extent, between the two articulations, which had remained sound: this great deficiency of bony substance was entirely supplied again by nature, and the patient acquired a new tibia, much firmer than that which he had lost. The advantages which must necessarily accrue to mankind, and the credit which surgery must acquire from observations of this sort, would induce us to hope that instances of them might become more frequent;

quent; and that the professors of the art might be thereby encouraged to attempt the preservation of limbs in all cases, where there should appear the least probability of bringing about this kind of regeneration. The observation, which I now offer to the public, is a farther proof of the powers, which nature is capable of exerting in these cases, when assisted by art. The quantity of bone regenerated is not indeed so considerable as in the preceding case; but the different age of the patient, and many other circumstances, render it equally curious and useful, and have induced me to think this account worthy to be presented to the Royal Society.

Francis Romain, called La Joye, of the village of Routot, &c. an invalid, and formerly a foot-soldier in the regiment of Languedoc, aged 41 years, received, at the battle of Rocou, a gun-shot wound in the left arm, about two fingers breadth below the head of the bone of the upper arm, which had been considerably shattered in this place by the ball.

Mr. Bouffelard, his surgeon, says, he found the situation of the wound too high to risk amputation. After seven months attendance however, the patient appeared to be cured; he was put upon the list of invalids, and stationed with one of those companies at Dieppe.

Encouraged by good health, he ventured to undertake the laborious business of a ship-wright; but the great fatigue, which this employment was attended with, produced abscesses in the arm which had been lately healed; and he was admitted into our hospital in the year 1755. I immediately made free incisions and counter-openings in the parts which contained

tained the matter, and extracted some splinters of bone; I then applied a proper bandage, and after the separation of several bony fragments, the cure was completed, at least a good cicatrice was formed.

He returned to his work, which was then going forward at Rouën, and was employed in carrying wood for the construction of flat-bottomed boats. His limbs in general were strong enough to support these loads; but his left arm, in which he had received the wound, was of little use to him, being shorter and weaker than the other.

On the 15th of March, 1760, being seized with a pleurisy and peripneumony, he was again brought into our hospital. After his recovery from this disease, an abscess was formed in the injured arm, which made an opening for itself in the fore-part, larger than a bullet. The arm was deprived of all motion, strength, and connection; and the callus of the former fracture appeared to be entirely destroyed by this fresh accident. In this state of the case, the patient being brought from the infirmary into the ward designed for wounded persons, I passed my probe into the wound, and found the bone of the arm bare, and carious to a very great extent: the middle of this carious part was rotten and totally destroyed throughout its whole substance. Anodine cataplasms were applied, to abate the inflammation and swelling, which attended the ulcer.

On the 15th of April I began to put in execution the plan which I had fixed upon for his cure; the first intention of which was, to lay bare the carious part of the bone in its whole length, which was rather
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more than three inches. The wound was then filled with pads of lint, and the second operation deferred to the next day.

It was the opinion of the by-standers, that the arm should be taken off at the shoulder-joint; but the great danger attending this kind of amputation deterred me from performing it, and induced me more particularly to consider, whether it might not be possible to save the limb.

The instance of Charles Lehee had sufficiently convinced, me that bones have the power to regenerate: it must indeed be allowed as a favourable circumstance to the vegetation of the bone, that Lehee was a child; but, although this patient was an adult, I considered that we knew not at what age nature had put a stop to this regenerative faculty, and that therefore no argument could be deduced from experience to prevent the expectation of the like success in the present case.

These considerations determined me, and on the 16th of April I performed the operation, by separating the upper and lower parts of this carious bone from their connections with the sound parts, by methods, which every operating surgeon will readily conceive. I measured the distance between the end of the bone left at the upper part, and the blade of the saw at the lower, and found it to be just three inches and ten lines.

The cavity was then filled with proper dressings; and the form of the arm, as well as its natural length, preserved by an instrument calculated to answer these intentions; the description of which I thought more

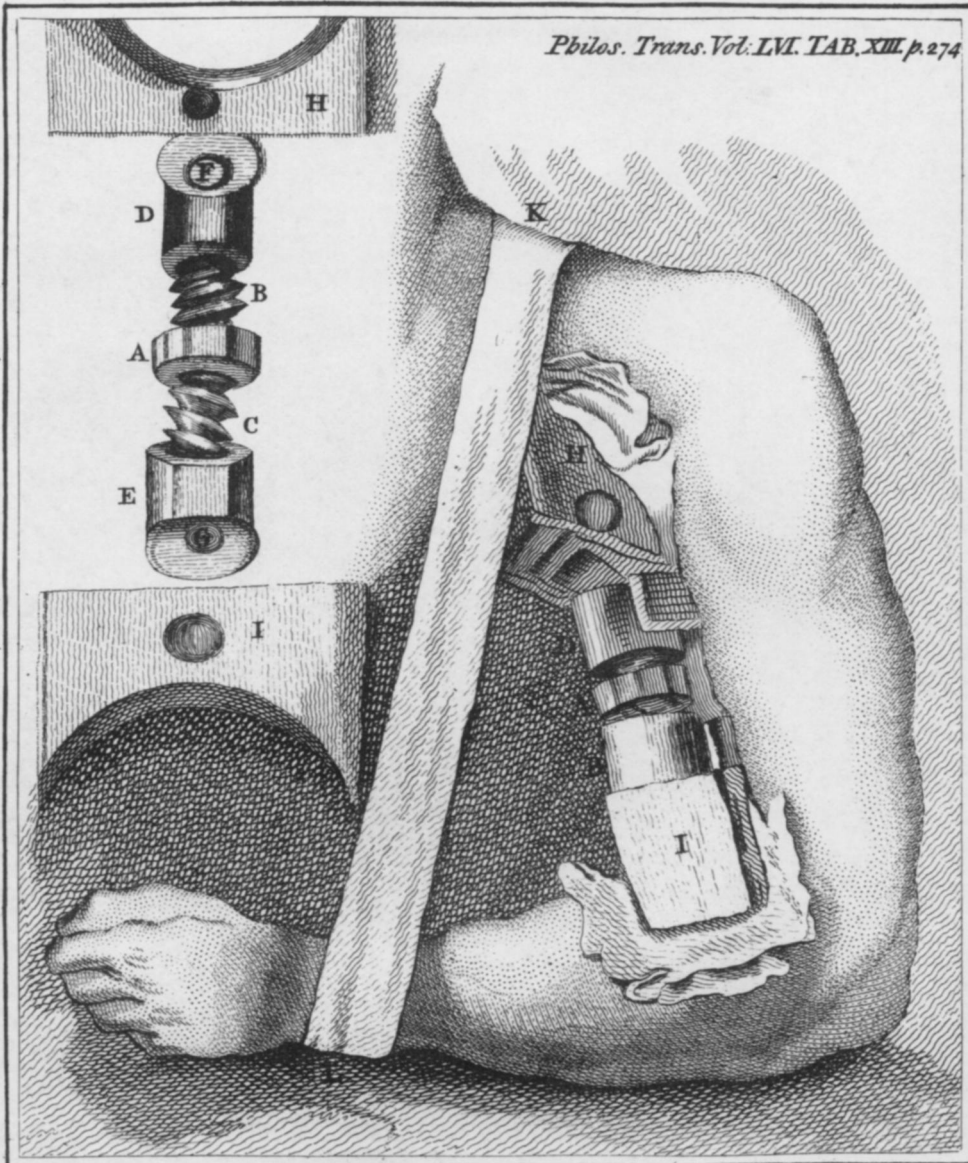
particularly deserving the attention of the Society, as it may be of service in many cases different from this.

TAB. XIII. A B C is a double screw, the turns of which are in contrary directions; these screws are moved by the handle A, in such a manner that, when each of them, B C, is screwed into its correspondent worm D E, one motion of the handle A brings the two worms D E nearer together; and a contrary motion sets them at a greater distance.

I invented this instrument about fifteen years ago, to compress the wounds of those, who had been cut for the stone, so as to prevent the passage of the urine, and thereby hasten the closing of the incision. To apply it properly in these cases, I passed a collar fastened to the neck of the patient, through the ring F, in the upper screw worm, and the bandage which supported the dressings, through the ring G, in the lower screw worm; and I have frequently experienced the success of this manœuvre.

In the year 1757, I made use of it to preserve an arm, fractured near the shoulder-joint, in its natural state of extension, by fastening the two flat rings F G, in the two pieces of wood H I; placing H under the arm-pit, and I upon the fore-arm against the bend of the elbow; and keeping the fore-arm bent by the sling K L.

I also applied this instrument in the present case; and in order to assist in giving the proper direction, and necessary solidity to the part, I supported the arm with a vambrace, or half-canal, made of one very thin piece of wood, which surrounded two thirds of the circumference of the limb. The whole
was



Drawn by M^{rs} David Daughter of the Author

J. Mynde sc.

was fastened by the bandages commonly used in fractures.

On the 15th of May, the twenty-ninth day after the operation, the wound having filled up very fast, the arm appeared to have a sort of firmness, that the muscles alone were incapable of giving it ; and on the 30th of the same month it had acquired a degree of solidity, which was nearly equal to the hardness of bone ; for it was strong enough to support itself, and yielded very little to the pressure that was made upon it ; but the patient was still unable to make any use of it, till the fifty-fifth day after the operation, at which time he began to move it a little.

It was scarce possible that so remarkable a case should not be attended with some accidents, in the course of the cure ; so that, on the 16th of June, I was not at all surprized at the appearance of a pustule on the upper part of the scar, from which there was an oozing of matter. On the next day I passed a probe into this opening, which entered with some difficulty the length of an inch ; but I did not find any splinters of bone, which I expected to meet with.

On the 18th of June, I made a large opening in this part, and extracted a point of bone, which seemed to have shot out in a very particular manner towards this pustule, and might probably have contributed, by its irritation, to have produced this fistula.

On the 19th of June, I took away the remains of this bony substance, situated underneath the above fistula, and which was but slightly attached to the neighbouring soft parts ; after which the cure of this wound was completed in fifteen days.

On the 25th of July, the hundredth day after the operation, I perceived another pustule breaking out near the lower part of the scar. I then began to suspect, as there had been a flow of matter from the arm for several years, that the constitution had acquired a habit of discharging itself at this part ; and attributed to that cause these trifling relapses, as well as the former more considerable one, which the patient had suffered.

From whatever spring these habitual discharges may be derived, and whatsoever may be the reasons assigned for the relapses they produce, it is well known that they are sometimes diverted or cured by issues ; I therefore ordered a large caustic to be applied to the patient's left leg. The arm was at this time very solid to the touch, but still yielded a little to its own weight, as the branch of a tree, or a piece of green wood ; I therefore had a bracelet of whalebone made to support and keep it steady.

On the 1st of August, the pustule, which I had perceived on the 25th of July, appeared to be much increased in size, and was spread out into fungous flesh : I passed a probe into it, and found some pieces of bone bare towards it's upper part.

On the 10th of August, a small scale was exfoliated, and from that time the fungous flesh began to disappear.

In September, five months after the operation, the issue afforded a very plentiful discharge, and had attracted the humour so powerfully towards this part, that the leg on which the caustic had been applied, appeared swelled and grew painful ; but, at the sametime,
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the arm was entirely cured ; having recovered all its actions and uses, together with its proper form and length. And on the 12th of October, Romain was discharged from the hospital, very thankful for the recovery of his health, and the perfect cure he had received. He then went to rejoin his company at Dieppe, and resume his former employments.

This observation, at the same time that it furnishes a remarkable instance of animal vegetation, strongly encourages surgeons to attempt the preservation of limbs, in all cases, where there is a possibility of bringing about this sort of regeneration, so useful to mankind, and so honourable to the art.